CLAIMS

1. An apparatus for selecting a subpopulation of spermatozoa, comprising:

   (a) a culture chamber having at least one first compartment, at least one second compartment and a passage enabling spermatozoa access between the at least one first compartment and the at least one second compartment; and,

   (b) means for generating a temperature gradient between the at least one first compartment and the at least one second compartment such that the temperature in said at least one first compartment is lower than the temperature in said at least one second compartment.

2. The apparatus according to claim 1, wherein the culture chamber is adapted for containing culture medium suitable for maintaining the motility of mammalian spermatozoa.

3. The apparatus according to claim 2, wherein the culture medium is suitable for maintaining the motility of human spermatozoa.

4. The apparatus according to claim 1, wherein the temperature gradient is discrete or continuous.

5. The apparatus according to claim 1, the passage further comprising a matrix between the at least one first compartment and the at least one second compartment.

6. The apparatus according to claim 5, wherein the matrix is selectively permeable to spermatozoa.

7. The apparatus according to claim 6, wherein the matrix comprises a material selected from the group consisting of: a biocompatible gel, fibrin substrate, silicon, carbon blocks or fibers, polysaccharides and collagen.

8. The apparatus according to claim 1, wherein the culture chamber comprises a biocompatible material.

9. The apparatus according to claim 8, wherein the culture chamber comprises a material selected from the group consisting of: glass, polycarbonate, polyethylene, polyurethane, ethylene-vinylacetate copolymer and polyolefins.

10. The apparatus according to any of claims 1 through 9, wherein the culture chamber is sterile or aseptic.

11. The apparatus according to any of claims 1 through 10, further comprising means for monitoring sperm motility.

12. The apparatus according to any of claims 1 through 11, wherein the culture chamber is disposable.

13. The apparatus according to any of claims 1 through 13, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability.

14. The apparatus according to claim 13, wherein the difference between the highest and the lowest temperatures of the temperature gradient is no more than 20°C.

15. The apparatus according to claim 13, wherein the difference between the highest and the lowest temperatures of the temperature gradient is at least 0.05°C.

16. A system for generating a subpopulation of spermatozoa enriched for capacitated spermatozoa, comprising:

(a) a culture chamber having at least one first compartment and at least one second compartment, wherein each compartment is adapted for containing a culture medium suitable for maintaining sperm viability and

a passage enabling sperm access between the at least one first compartment and the at least one second compartment;

(b) means for generating a temperature gradient in the culture chamber between said at least one first compartment and said at least one second compartment, such that the temperature in said at least one first compartment is lower than the temperature in said at least one second compartment; and, optionally

(c) means for retrieving spermatozoa from said at least one second compartment.

17. The system according to claim 16, wherein the culture medium is suitable for maintaining viable mammalian spermatozoa.

18. The system according to claim 17, wherein the culture medium is suitable for maintaining viable human spermatozoa.

19. The system according to claim 16, wherein the temperature gradient between the at least one first compartment to the at least one second compartment is discrete or continuous.

20. The system according to claim 16, wherein the passage comprises a matrix between the at least one first compartment and the at least one second compartment.

21. The system according to claim 20, wherein the matrix is permeable to spermatozoa.

22. The system according to claim 21, wherein the permeable matrix is selected from the group consisting of: a biocompatible gel, fibrin substrate, silicon, carbon blocks or fibers, polysaccharides and collagen.

23. The system according to claim 16, wherein the culture chamber comprises a biocompatible material.

24. The system according to claim 16, wherein the culture chamber comprises a material selected from the group consisting of: glass, polycarbonate,

polyethylene, polyurethane, ethylene-vinylacetate copolymer and polyolefins.

25. The system according to any of claims 16 through 24, wherein the culture chamber is sterile or aseptic.

26. The system according to any of claims 16 through 25, further comprising means for monitoring sperm motility.

27. The system according to any of claims 16 through 26, wherein the culture chamber is disposable.

28. The system according to any of claims 16 through 27, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability.

29. The system according to claim 28, wherein the difference between the highest and the lowest temperatures of the temperature gradient is no more than 20°C.

30. The system according to claim 28, wherein the difference between the highest and the lowest temperatures of the temperature gradient is at least 0.05°C.

31. The system according to any of claims 16 through 30, further adapted for employing semen washing.

32. A method for generating a subpopulation of spermatozoa enriched with capacitated spermatozoa, comprising:

(a) providing a population of spermatozoa in at least one first site;

(b) exposing the population of (a) to a temperature gradient induced between the at least one first site and at least one second site, wherein the temperature at the at least one first site is lower than the temperature at the at least one second site;

(c) obtaining a subpopulation of spermatozoa enriched with capacitated spermatozoa from the at least one second site; and, optionally,

(d) repeating step (b) at least once, with the population obtained in (c) .

33. The method according to claim 32, wherein step (b) further comprises monitoring sperm motility from the at least one first site to the at least one second site.

34. The method according to claim 33, wherein sperm motility is evaluated in comparison to a standard.

35. The method according to any of claims 32 to 34, wherein the population of spermatozoa comprises non-human mammalian spermatozoa.

36. The method according to claim 35, wherein the population of spermatozoa comprises human spermatozoa.

37. The method according to any of claims 32 through 36, wherein the temperature gradient is discrete or continuous.

38. The method according to claim 37, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability.

39. The method according to claim 38, wherein the difference between the highest and the lowest temperatures of the temperature gradient is no more than 20°C.

40. The method according to claim 38, wherein the difference between the highest and the lowest temperatures of the temperature gradient is at least 0.05°C.

41. The method according to any of claims 32 through 40, further comprising retrieving a population of spermatozoa after step (b) from the at least one second site.

42. The method according to claim 41, wherein the retrieved spermatozoa is utilized for a fertility treatment.

43. The method according to claim 42, wherein the fertility treatment is selected from the group consisting of: artificial insemination, intrauterine insemination (IUI), intracytoplasmic sperm injection (ICSI), in vitro fertilization (IVF), micromanipulation IVF and intra-vaginal fertilization.

44. The method according to any of claims 32 through 43, further comprising semen washing prior to step (a).

45. An assay for evaluating sperm quality in a population of spermatozoa, comprising:

(a) providing a population of spermatozoa in a first site;

(b) exposing the population of (a) to a temperature gradient induced between the first site and at least one second site, such that the temperature at the at least one second site is higher than at said first site; and,

(c) evaluating the percentage of spermatozoa within the population accumulated at the second site of (b) in comparison to a standard sperm population, wherein the percentage of spermatozoa migrating along the temperature gradient between said first site and the at least one second site is a measure of sperm quality.

46. The assay according to claim 45, wherein the population of spermatozoa comprises mammalian spermatozoa.

47. The assay according to claim 46, wherein the population of spermatozoa comprises human spermatozoa.

48. The assay according to any of claims 45 through 47, wherein the temperature gradient is discrete or continuous.

49. The assay according to claim 48, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability.

50. The assay according to claim 49, wherein the difference between the highest and the lowest temperatures of the temperature gradient is no more than 20°C.

51. The assay according to claim 49, wherein the difference between the highest and the lowest temperatures of the temperature gradient is at least 0.05°C.